

# Farmers' Perception on Durian Innovation: A Case Study of GAP-Certified Orchards in Chanthaburi Province, Eastern Thailand

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## ABSTRACT

The objectives of the study were to determine 1) farmers' perceptions including knowledge, practices, and attitude towards durian innovation, 2) the relationship between some personal background of durian growers with their perceptions, and 3) constraints and recommendations on durian innovation. Seventy-one certified durian growers in Chanthaburi province, Eastern Thailand were selected through a purposive and proportional stratified sampling technique. Data were collected using an interview schedule. Testing the reliability of knowledge and practices on durian innovation used the Kuder-Richardson reliability coefficient 21 with a reliability of 0.72. The semantic differential scaling methods of two attitude durian innovations were obtained by internal consistency as determined by the reliability of Cronbach's alpha values of 0.89 and 0.84. Descriptive statistics were presented as frequencies, percentages, arithmetic means, and standard deviations. The Pearson product moment correlation coefficient was used as an inferential statistic for hypothesis testing. The findings revealed that most farmers had a good perception of orchard hygiene and environmental management. Almost all of the farmers agreed that it was necessary to practice harvesting and postharvest management. The most important factors related to knowledge and practices on durian innovation were the number of marketing channels, the number of groups a farmer belonged to, the area cultivated, and durian cultivation experiences. The number of marketing channels was also identified as the factor related to attitude towards durian innovation practice requirements, while the cultivated area was found to be a factor related to attitude towards durian innovation affordability. The greatest constraint was the few niche markets available for domestic demand. The most common recommendation was to implement urgent measures to get rid of immature durian fruit in the market.

**Keywords:** good agricultural practice, durian innovation

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## บทคัดย่อ

วัตถุประสงค์ของการวิจัยเพื่อศึกษา 1) การรับรู้ของเกษตรกรประกอบด้วยความรู้ การปฏิบัติ และทัศนคติ ที่มีต่อนวัตกรรมเกี่ยวกับทุเรียน 2) ความสัมพันธ์ระหว่างสภาพภูมิหลังบางประการกับการรับรู้ในเรื่องนวัตกรรมเกี่ยวกับทุเรียนของเกษตรกร และ 3) ข้อจำกัดและข้อเสนอแนะในการพัฒนานวัตกรรมเกี่ยวกับทุเรียน กลุ่มตัวอย่าง คือเกษตรกรผู้ปลูกทุเรียนจำนวน 71 คนในจังหวัดจันทบุรี ที่ได้รับการรับรองแหล่งผลิตตามระบบ GAP จากกรมวิชาการเกษตร กระทรวงเกษตรและสหกรณ์ แบบสัมภาษณ์เป็นเครื่องมือที่ใช้ในการเก็บรวบรวมข้อมูล การทดสอบความเที่ยงของเครื่องมือวัดความรู้ และการปฏิบัติเรื่องนวัตกรรมเกี่ยวกับทุเรียนด้วย KR-21 มีค่าเท่ากับ 0.72 เครื่องมือวัดทัศนคติทั้งสองด้านคือนวัตกรรมเกี่ยวกับทุเรียน ทดสอบความสอดคล้องภายในด้วยวิธีของ Cronbach มีค่าเท่ากับ 0.89 และ 0.84 สถิติเชิงพรรณนาที่ใช้คือ ค่าความถี่ ร้อยละ ค่าเฉลี่ย และค่าเบี่ยงเบนมาตรฐาน ส่วนสถิติเชิงอนุมานที่ใช้ทดสอบสมมุติฐาน คือ ค่าสัมประสิทธิ์สหสัมพันธ์เพียร์สัน ผลการวิจัยพบว่า เกษตรกรมีความรู้และการปฏิบัติในระดับดีในประเด็นเรื่อง สุขลักษณะและการจัดการสภาพแวดล้อมภายในบริเวณสวน เกษตรกรเกือบทั้งหมดเห็นว่า ประเด็นที่มีความจำเป็นต้องปฏิบัติคือ การเก็บเกี่ยวและปฏิบัติการหลังการเก็บเกี่ยว ผลการทดสอบสมมุติฐาน ชี้ให้เห็นว่า ปัจจัยที่มีความสัมพันธ์กับความรู้และการปฏิบัติของเกษตรกรในเรื่องนวัตกรรมเกี่ยวกับทุเรียน คือ พื้นที่ปลูก ประสบการณ์ในการปลูกทุเรียน การเป็นสมาชิกกลุ่ม ช่องทางการตลาด และปัจจัยที่มีความสัมพันธ์กับทัศนคติของเกษตรกรในเรื่องมีความจำเป็นต้องปฏิบัติตามคำแนะนำ คือ ช่องทางการตลาด ส่วนปัจจัยที่มีความสัมพันธ์กับทัศนคติของเกษตรกรในเรื่องความสามารถที่ปฏิบัติได้ตามคำแนะนำ คือ พื้นที่ปลูก ข้อจำกัดที่พบมาก

ที่สุดคือ ขาดตลาดจำเพาะสำหรับผลผลิต ส่วนข้อเสนอแนะในการพัฒนาการผลิตทุเรียนที่เกษตรกรส่วนมากต้องการมากที่สุดคือ ควรเร่งนำมาตราการมาใช้เพื่อลดยุทธศาสตร์ทุเรียนอ่อน และเป็นการป้องกันไม่ให้มีทุเรียนอ่อนเข้าสู่ระบบตลาด

**คำสำคัญ:** เกษตรดีที่เหมาะสม นวัตกรรมเกี่ยวกับทุเรียน

## INTRODUCTION

Durian (*Durio zibethinus* Murr.) is a significant economic tropical fruit of Thailand where there has been a trend of increased export of durian. For example, from 2001 to 2011, the quantity of fresh durian exported from Thailand jumped from 116,674 t to 207,501 t (Office of Agricultural Economics, 2011), accounting for a 77.85 percent increase compared with the last decade. Nevertheless, in the present circumstances, agricultural products have been affected by free trade. Products must meet standards in order to stay competitive in the world market and good agricultural practice (GAP) is one standard of practice required to meet and satisfy consumer demand. The Ministry of Agriculture and Cooperatives (MOAC) of Thailand has reformed GAP to minimize the restrictions caused by barriers in importing countries and GAP has been promoted and developed on farms countrywide.

Chanthaburi province is at the heart of durian cultivation in Thailand. Each year, more than 30 percent of durian fruit in the Kingdom comes from Chanthaburi; for example, in the crop year 2008/09, the total volume from this area was 217,194 t (Department of Agricultural Extension, 2009). Furthermore, Chanthaburi has several advantages in durian production towards market standardization including available physical factors, available local wisdom and skilled and experienced growers, and also various market channels (Thardphaiboon, Aungsuratana, Vanichkul, Wattana, & Aroonrungsikul, 2009). However, only 2,325

durian orchards in this area, accounting for 30.58 percent of GAP-registered growers, were entitled to GAP certification (Office of Agricultural Research and Development Region 6, 2007).

In order to develop innovation to encourage durian growers toward standardized marketing, this investigation aimed to determine 1) farmers' perceptions including knowledge, practices, and attitudes towards durian innovation, 2) the relationship between some personal background information on the durian growers with their perceptions, and 3) the constraints on durian innovation and recommendations for improvement.

### **Operational definitions**

*Farmer* refers to a durian-certified orchard grower in Chanthaburi province, eastern Thailand in the seasonal crop year 2006/07.

*Durian innovation* refers to the durian cultivation technique that was developed as an upgrade to the GAP as recognized by the Department of Agriculture (DOA) and agricultural management aspects. The model consists of thirty-eight statements and is divided into seven main items: 1) growth stage management, 2) tree support for flowering, 3) inducing flowering and fruit setting, 4) fruit development and quality fruit production, 5) harvesting and postharvest management, 6) orchard hygiene and environmental management, and 7) production planning.

*Farmers' perceptions* refers to the views of farmers on the existing knowledge, practices, and the attitudes of growers toward durian innovation.

*Knowledge* refers to the current understanding concerning durian innovation.

*Practice* refers to existing cultivation techniques involved in durian innovation.

*Attitudes* refers to farmer's opinions toward the application of durian innovation.

## **METHODOLOGY**

### **Scope of the study**

The study was conducted in Chanthaburi province, eastern Thailand. The population sampled was durian growers in Chanthaburi who were registered and their durian orchards had been certified for durian GAP by DOA, MOAC in the crop year 2006/07.

### **Population and sampling technique**

The sample population consisted of 1,986 farmers whose orchards had been certified by DOA. The sample size of 71 durian growers was estimated using the formula developed by Arkin (1974). The respondents were selected through a purposive sampling technique of certified orchards in Chanthaburi and a proportional stratified sampling technique based on the size of the population in each district in Chanthaburi.

### **Data collection**

The data were collected in the seasonal crop year 2006/07 from respective selected farmers by means of an interview schedule. The questions covered the personal background of the respondents and their perceptions in terms of knowledge, practices and attitudes on durian innovation. The interview schedule was tested with 30 durian growers in Klung district, Chanthaburi province.

Testing of the reliability of knowledge and practices on durian innovation used the Kuder-Richardson reliability coefficient (KR-21) with the reliability value being 0.72 (Kuder & Richardson, 1937). The semantic differential scaling methods of attitude towards requirement to practice durian innovation and affordability of durian innovation were obtained by internal consistency using Cronbach's alpha with values of 0.89 and 0.84 (Cronbach, 1951).

### **Statistical analysis**

The socio-economic analysis utilized both descriptive and inferential statistics. Frequencies, percentages, arithmetic means, and standard deviations were used to describe farmers'

perceptions on durian innovation and their constraints and recommendations. The Pearson product moment correlation coefficient was determined for some factors of the respondents related to their perceptions on durian innovation.

### Perception measurement

1. Knowledge and practice on durian innovation were measured by mean scores of each main item. The score range was set based on the average of the maximum and minimum scores for the whole test set and the test was interpreted into three levels as follows:

- 1) less than 0.50 = poor
- 2) 0.50 - 0.79 = moderate
- 3) greater than 0.79 = good.

2. Attitudes of farmers towards durian innovation were measured by the farmers' opinions on two aspects; first a requirement to practice durian innovation (A1) and second, the affordability of applying durian innovation (A2). The opinion level was applied at three levels of internal consistency based on the seven levels of the Osgood scale (Osgood, Tannenbaum, & Suci, 1957).. The interpretation of mean scores for each main item was as follows:

- 1) less than 3.0 = less necessary (A1); less applicable (A2),
- 2) 3.0 - 5.0 = moderate necessary (A1); moderate applicable (A2), and
- 3) greater than 5.0 = necessary (A1); applicable (A2).

## RESULTS AND DISCUSSION

### Comparison study between knowledge and practices on durian innovation

The results on the study of the knowledge and practices of durian growers on durian innovation within the seven main items are presented in Table 1. The majority of farmers had knowledge and practices at a good level concerning orchard hygiene and environmental management,

accounting for 80.28 and 56.34 percent of farmers, respectively. This result may have been due to the fact that these two items are required for regular compliance regarding food safety that is encouraged under the certification process for their orchards. The importance of food safety concerns by the respondents was paralleled in the study of Giritlioglu, Batman, and Tetik (2011) and Jevšnik, Hlebec, and Raspor (2009). On the contrary, the current investigation revealed different items with a good level of knowledge and practice to the research of Obopile, Munthali, and Matilo (2008) who found that farmers had good knowledge on pest management, but they continued with pesticide application. Furthermore, Wilson, Hooker, Tucker, LeJeune, and Doohan (2009) also indicated that farmers understood integrated weed management well, but they still used wrong practices.

The above findings indicated that for increased improvements in farm practice, particularly with regard to food safety and environmental concerns, more correct knowledge and practices should be promoted to the farmers.

### Farmers' attitude to durian innovation

As shown in Table 2, most farmers (more than 75%) indicated that all items of durian innovation requirement must be practiced. The findings were consistent with Jevšnik et al. (2009) who pointed out that a majority of the sauerkraut growers studied believed in the strict application of all requirements of GAP.

The farmers' attitudes towards durian innovation affordability are shown in Table 3, which reveals that four items of durian innovation were recognized by a majority of farmers—orchard hygiene and environmental management (63.38%), growth stage management (61.97%), harvesting and postharvest management (60.56%), and fruit development and fruit production quality (60.56%). In addition, they also mentioned that if they had applied all the recommendations, their products would have met the standardization requirements.

The findings on farmers' attitudes indicated that there was an opportunity to implement durian innovation with the growers involved in the study.

#### Factors related to farmers' perceptions on capability enhancement to durian innovation

The statistical analyses identified four factors related to farmers' perception on durian innovation—number of marketing channels, number of groups a farmer belonged to, cultivated areas, and durian cultivation experiences.

The findings shown in Table 4 reveal that there were significant positive correlations between the number of marketing channels with knowledge and practices on durian innovation and also with attitude toward the requirement for innovation practice (A1) at the .01 level of significance, which indicates that if farmers had more marketing channels, they would have greater knowledge and more practice of durian innovation and they would also have a more positive attitude toward the requirements of durian innovation practice. The

**Table 1** Comparison between knowledge and practices on durian innovation

Item of durian innovation	Knowledge (K)			$\bar{X}$	SD	Practices (P)			$\bar{X}$	SD
	No.					No.				
	good	moderate	poor			good	moderate	poor		
1.Growth stage management	20 (28.17)	47 (66.20)	4 (5.63)	.61	.27	17 (23.94)	44 (61.97)	10 (14.08)	.55	.31
2.Supporting tree for flowering	28 (39.44)	39 (54.93)	4 (5.63)	.67	.29	22 (30.99)	34 (47.89)	15 (21.13)	.55	.36
3.Inducing flowering and fruit setting	24 (33.80)	28 (39.44)	19 (26.76)	.65	.24	22 (30.99)	32 (45.07)	17 (23.94)	.63	.22
4.Fruit development and quality fruit production	35 (49.30)	30 (42.25)	6 (8.45)	.68	.18	32 (45.07)	30 (42.25)	9 (12.68)	.66	.19
5.Harvesting and postharvest management	30 (42.25)	21 (29.58)	20 (28.17)	.70	.30	28 (39.44)	32 (45.07)	11 (15.49)	.74	.25
6.Orchard hygiene and environmental management	57 (80.28)	10 (14.08)	4 (5.63)	.81	.17	40 (56.34)	26 (36.62)	5 (7.04)	.73	.15
7.Production planning	25 (35.21)	41 (57.75)	5 (7.04)	.72	.14	21 (29.58)	39 (54.93)	11 (15.49)	.69	.19

Note: Figures in parentheses are percentages from total of the respondents

farmers also considered that if they had more channels to access the market, they would pay more attention to learning and practicing. Thus, they needed more knowledge and practice of durian innovation. For these reasons, the farmers considered durian innovation was important and they needed more knowledge and more practice of durian innovation in order to produce better quality products to access the market.

The results also revealed that there was a significant positive correlation at the .01 level between the number of groups a farmer belonged to and the knowledge and practice of durian innovation which indicated that the farmers belonging to more groups had more knowledge and practice of durian innovation, as they had more opportunities to access the intervention program and also to access a broader range of knowledge and practices of durian innovation.

Furthermore, the investigations found that there was a significant positive correlation at the .05 level between the area cultivated and knowledge and

practice of durian innovation and also with the attitude toward durian innovation affordability (A2), as farmers who had large durian orchards, also had a greater capital investment and so were more motivated to increase their knowledge and cultivation techniques to supply better products and make greater profits.

Finally, the findings indicated that there was a significant positive correlation at the .05 level between durian cultivation experience and the knowledge and practice of durian innovation because farmers with more experience in durian cultivation, had accumulated more knowledge and practice.

The findings indicate that concerned organizations wishing to increase farmers' uptake on durian innovation must know something about the general background of the target audience including the number of marketing channels, the number of groups each farmer belongs to, the area of durian cultivated, and the experience of the farmers at durian cultivation, respectively.

**Table 2** Attitude on durian innovation practice requirement

Item of durian innovation	Attitude on practice requirement (A1)			(n=71)	
	No.			$\bar{X}$	SD
	necessary	moderate	less necessary		
1. Growth stage management	54 (76.06)	17 (23.94)	0 (0.00)	5.73	.93
2. Supporting tree for flowering	54 (76.06)	14 (19.72)	3 (4.23)	5.7	1.16
3. Inducing flowering and fruit setting	55 (77.46)	15 (21.13)	1 (1.41)	5.51	.89
4. Fruit development and quality fruit production	65 (91.55)	6 (8.45)	0 (0.00)	6.02	.76
5. Harvesting and postharvest management	68 (95.77)	3 (4.23)	0 (0.00)	5.83	.52
6. Orchard hygiene and environmental management	62 (87.32)	9 (12.68)	0 (0.00)	6.05	.65
7. Production planning	64 (90.14)	7 (9.86)	0 (0.00)	6.22	.76

Note: Figures in parentheses are percentages from total of the respondents

**Table 3** Attitude on durian innovation affordability

Item of durian innovation	Attitude on affordability(A2)			$\bar{X}$	SD
	No.				
	applicable	moderate	less applicable		
1.Growth stage management	44 (61.97)	27 (38.03)	0 (0.00)	5.42	.90
2.Supporting tree for flowering	29 (40.85)	40 (56.34)	2 (2.82)	4.9	1.13
3.Inducing flowering and fruit setting	33 (46.48)	37 (52.11)	1 (1.41)	4.9	.84
4.Fruit development and quality fruit production	44 (61.97)	27 (38.03)	0 (0.00)	5.2	.74
5.Harvesting and postharvest management	43 (60.56)	28 (39.44)	0 (0.00)	5.3	.65
6.Orchard hygiene and environmental management	45 (63.38)	26 (36.62)	0 (0.00)	5.31	.64
7.Production planning	26 (36.62)	38 (53.52)	7 (9.86)	4.60	1.12

Note: Figures in parentheses are percentages from total of the respondents

**Table 4** Relationship between some personal factors and perception on durian innovation of farmers

Personal factors of farmers	Farmers' perception			
	Knowledge (K)	Practices (P)	Attitude (A)	
			Practice requirement (A1)	affordability (A2)
Number of marketing channels	.413 **	.465 **	.324 **	.189
Number of groups each farmer belongs to	.526 **	.411 **	.116	.039
Cultivated areas	.267 *	.300 *	.197	.281*
Durian cultivation experiences	.270 *	.284 *	.226	.194

\*\*  $p < .01$ , \*  $p < .05$

### Constraints to improving durian innovation

Several constraints to developing increased production and improved marketing through durian innovation were mentioned by more than half of the respondents. First, almost all of the farmers (97.18%) indicated that they lacked niche markets in domestic demand to support GAP products. Second, 66.20 percent of farmers stated that they had high input costs. Third, 56.34 percent of farmers complained that their products only sold for low prices and they had no bargaining power. Additionally, 54.93 percent pointed out that the market standards were too high for them for normal practice; in other words, they had difficulty practicing GAP (Figure 1). All constraints should be addressed if improvements are to be achieved.

## CONCLUSIONS AND RECOMMENDATIONS

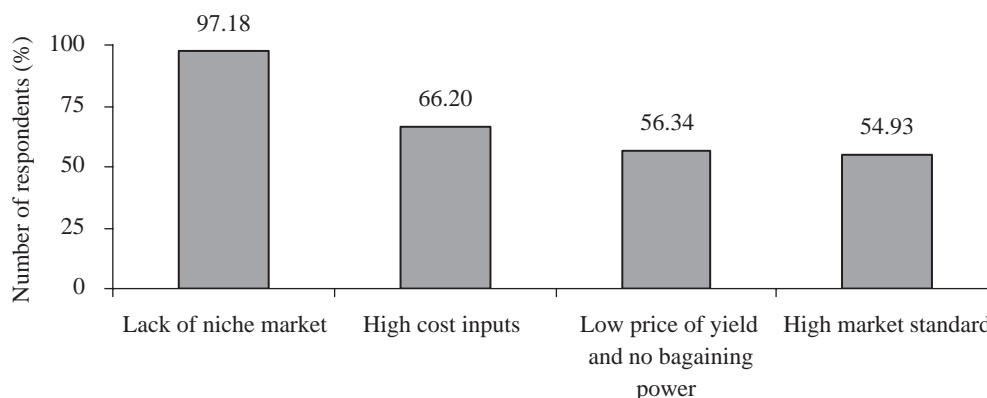
This study aimed to investigate farmers' perceptions on durian innovation and some personal background related to their perceptions. The findings revealed that the majority of farmers had good knowledge and good practice of durian innovation with regard to orchard hygiene and environmental management.

With regard to their attitude towards the requirement for durian innovation, they believed that good practice was significant in all

requirements to gain good quality yields to obtain higher prices, and to have access to more market channels and export standardization. However, in terms of the affordability of durian innovation, it was found that more than half of farmers agreed to apply four items on durian innovation—namely, orchard hygiene and environmental management, growth stage management, harvesting and postharvest management, and fruit development and quality fruit production.

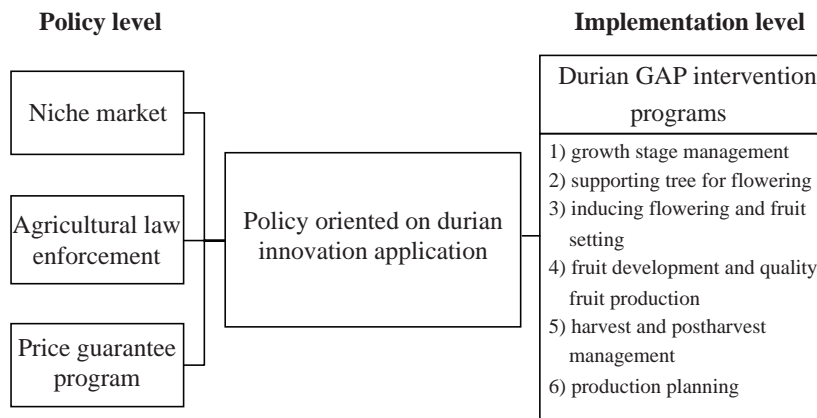
The results also showed that the factors related to farmers' perceptions were the number of marketing channels, the number of groups a farmer belonged to, the amount of area cultivated, and experience in durian cultivation, respectively. The cultivated area was the most important factor affecting farmers' attitudes towards the affordability of durian innovation. On the contrary, the number of marketing channels was considered as the most important factor affecting farmers' attitude towards the requirement for innovative durian practices.

The empirical evidence from this investigation indicated that improvements in durian GAP should be promoted in conjunction with the promotion of GAP in six of the seven items provided for consideration in: growth stage management, inducing flowering and fruit setting, supporting trees during flowering, production planning, harvesting and postharvest management, and fruit development and fruit production quality,



**Figure 1** Constraints to improve production and marketing durian innovation





**Figure 2** Model of policy oriented toward application of durian innovation

because less than fifty percent of the farmers had poor knowledge and practices of these six items.

Action on durian innovation should be promoted at the policy and the implementation levels (Figure 2). At the policy level, the focus should be on: 1) niche markets for GAP products should be urgently developed in order to ensure the sale of the quality yield from the certified orchards, 2) agricultural law enforcement should introduce urgent measures to get rid of immature durian fruit in the market, and 3) a price guarantee intervention program as an incentive should be provided for certified orchards growers. At the implementation level, the focus should be on promotion of the six main items of durian innovation: 1) growth stage management, 2) supporting trees for flowering, 3) inducing flowering and fruit setting, 4) fruit development and quality fruit production, 5) harvesting and postharvest management, and 6) production planning.

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